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type on the printing-press. The following short paragraph is printed from an electrotpe made direct from a leaden matrix produced upon the typograph:—

Although more than four hundred years have elapsed since the art was invented, it is a singular fact that the bulk of the world's printing to-day is done with movable types "set up" on the same plan adopted originally.

To the eye of the practical printer there are several defects in the above sample paragraph. The first word is not set in far enough from the end of the line. That is the fault of the operator, for which the machine cannot be held responsible. Some of the letters are too close together, and others too far apart; the letters do not range well, giving an irregular or 'squabbed' appearance to the line; some of the letters, notably the *e*, do not correspond in size with the others; and some, again, appear to be higher than the rest, giving a blacker impression. All these defects are doubtless due to imperfect workmanship on the part of machinists and type-cutters, and may easily be overcome in a more perfect machine. Another defect noticeable in the work of this machine is uneven spacing between the words. In the machine as at present constructed, this defect cannot be remedied except by almost superhuman skill on the part of the operator; but the inventors claim that in future machines, and with type cut on a 'unit' system (the width of face of each type being a known multiple of some unit taken as a standard), justification will be as easily accomplished as in ordinary type-setting. This remains to be seen. Still another defect, and a very grave one, is the difficulty of correcting errors. A wrong letter in a word, or a wrong word in a sentence, if about the same size as the right one, may be corrected by smoothing down the metal and repunching over the smoothed surface. But the omission of one or more words, or their repetition, can be remedied only by a new matrix, whole or in part. Neither can changes be made in the wording of a sentence, something frequently desired by writers upon inspection of their proofs. With 'copy' prepared exactly as it should be printed, and an operator proof against error, this defect would not be conspicuous; but perfection is no more prevalent among writers and operators than among inventors and machinists.

But were the machine perfect in all other respects, there is still one defect which practical printers who have examined the typograph and its work consider fatal, and one which, in the opinion of experts, will be found extremely difficult if not impossible to overcome. When the

steel type is forced into the soft metal of the matrix, it leaves a perfect impression; but, when the next type is forced in, the metal is pushed aside to a greater or less extent, thereby disturbing the previous impression, and preventing the full face of all the type from 'showing up' in print. This defect will be readily seen by comparing the sample paragraph with the contiguous paragraphs, which are printed from ordinary type. In the last three words of the sample paragraph, the metal has not been so much disturbed, as the letters are purposely set some distance apart, that there may be a protecting wall of metal left between them. Of course, it may be possible to discover some material for the matrix that will give better results in this respect, or some way may be devised to punch the metal without forcing it aside. These problems remain unsolved. In its present stage, the typograph shows an important advance in the direction of cheaper and more rapid book and newspaper work; but much yet remains to be done before the machine can be placed upon the market as a commercial and typographical success.

#### NOTES AND NEWS.

FROM a correspondent in Tokio we learn that on his return from America he presented a report on the resolutions of the Washington meridian and time congress. A committee was appointed by the proper authorities to discuss the matter, and on the 12th of July an imperial decree to the following purpose was issued: first, the meridian passing through Greenwich shall be the initial meridian for longitude; second, longitude shall be counted from this meridian in two directions up to 180°; third, the time of the meridian of 135° east shall be used as the standard time throughout Japan.

—A fireman on the steamer *Alvo*, which lately arrived in New York from Central America, was taken sick, and entered St. Vincent's hospital for treatment. The fever from which he suffered simulated yellow-fever to such a degree as to make his removal to the Reception hospital of the health department advisable. The attack proved fatal, and an autopsy revealed a yellow liver, a stomach filled with blood, and the other organs jaundiced. It was the unanimous opinion of the physicians present that yellow-fever was the cause of death. It is as yet unexplained how and where the disease was contracted, as it is reported that the health officer of the port never knew of yellow-fever existing at any port at which the *Alvo* had been.

—The report of F. H. Wines, special agent of the tenth census, on the defective, dependent, and

delinquent classes, is full of interesting details. The number of males confined in prisons and work-houses in the United States in 1880 was 53,604, and of females, 5,005. The number of prisoners to each million of the population was 1,069: in 1870 it was but 853. There were 1,833 insane persons, 1,533 idiots, and 976 blind persons to each million inhabitants. There were 21,595 out-door paupers, and 66,203 inmates of almshouses, during the census year.

—A writer in the August number of the *Nineteenth century* begins an interesting discussion on the question, 'Are animals happy?' The view that the author takes practically amounts to saying that an animal with a less highly organized brain is more apt to be happy. While many of his inferences are suggestive, they are not founded on that broad knowledge of biological facts which the subject deserves. The article has been severely criticised in English periodicals.

—It has recently come to light that the state of New York, in 1806, paid to John M. Crous a thousand dollars for a remedy against hydrophobia which he considered infallible. The measure was advocated by DeWitt Clinton and Chancellor Kent. This remedy consisted of one ounce of the jaw-bone of a dog, burned and pulverized; the false tongue of a newly foaled colt, dried and pulverized; and 'a scruple of verdigrease,' raised on the surface of old copper by laying it in moist earth. The warrant of the comptroller on which the money was paid, and the receipt of Crous, are on file with other state papers at Albany.

—The submarine torpedo-boat briefly described in *Science* recently is having some changes made in its machinery and in details of construction. It will be equipped with horizontal rudders at the bow, in addition to those at the stern, so that it may be submerged with an 'even keel.'

—One of the amateur aeronauts whose experiences are recorded in the September number of the *Century* makes the interesting observation, that, immediately upon alighting, all remembrance of the events of the journey is gone, and only after several hours can he recall his experiences. He adds, that after a battle, soldiers have experienced the same phenomena.

—The temperature of August, 1886, was over four degrees above normal in Iowa, being the hottest on record for over twenty-five years, excepting August, 1881, which was one degree warmer still. The number of hot days on which the temperature reached or exceeded 86° was twenty-one, which is the highest ever recorded, being three in excess of August, 1881.

## LETTERS TO THE EDITOR.

*\*.\*Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

### Barometer exposure.

MR. CLAYTON'S last letter on the above subject shows that he has been considering all along the so-called 'serration effect.' It seems to me that this narrows down the problem very materially. Kindly allow me space to emphasize a point or two that I laid down in my previous letter, and to give a few facts regarding the above effect. I still think, that, if the wind has a tendency to diminish the pressure in a room by blowing across a chimney communicating with it, there will be a slight draught up the chimney, of the air forced into the room on the windward side. Mr. Clayton's theory of a smoky chimney is satisfactory only as a theory, but the facts are all against him. Any builder will tell him that a properly constructed chimney will draw under the conditions mentioned by him; namely, 'wind blowing across it.' He will also find a large number of cases in Boston where chimneys have been built up in such a way as to make the effect suggested by him a maximum; and this, too, to obviate a lack of draught.

I have studied the above serration effect with some care, and have compared wind-velocity and barograph sheets for nearly two years. The barograph is enclosed in a rather tight case, and its sheet has a motion of about .75 of an inch per hour. The highest wind noted was 36 miles per hour, though there may have been momentary gusts reaching 50 miles per hour. The effect was noticed rather faint with a velocity of 4 miles per hour. Several times a velocity of 28 miles per hour produced no effect; and velocities of 20 miles per hour, with no effect, were quite frequent. Almost all the cases occurred with relatively low pressure, and they were often mixed up with the irregular fluctuations so often noticed at the centre of a cyclone. The maximum effect below the middle line was about .010 of an inch, with a mean value of about .005 of an inch. One singular fact noted was that often there would be a jump of .010 of an inch above the general trend of the line of pressure. A part of this might be caused by the momentum of the pencil, but this would be very slight. It would be very interesting to try the effect of opening a window to windward while the serration effect is taking place. I believe this has already been done to some extent, with the result that the serrations are not materially changed. At all events, I find that among those who have studied the problem in the light of these barograph sheets, there is a well-established belief, that while the wind has an influence in producing the serrations, yet just how it acts is problematical. Any such serration effect by the wind as .100 of an inch below the general pressure line is well-nigh incredible. I am so strongly convinced on this point, that I am perfectly willing, for the benefit of the readers of *Science*, to be at a little expense in order to enable us to see this effect for ourselves. If Mr. Clayton will make a tracing of one of his best effects, and send it to *Science*, I will furnish the editor with the funds necessary to reproduce it. I impose but two conditions, and will modify these if Mr. Clayton thinks them too severe. The conditions are, 1°, the chimneys or trap-doors of the house, or connecting with the room, where the barograph is, must be near the centre of a rather flat roof, that is, not at the edge or near the